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A REVIEW OF THE SCARAB GENUS *ACOMA* (COLEOPTERA, SCARABAEIDAE)

BY MONT A. CAZIER¹

The genus was originally described by Casey (1890) and was based on a new species named *brunnea*. Casey described the genus in the subfamily Melolonthinae and placed it next to the genus *Podolasia* which would put it in the tribe Chasmatopterini. However, he stated that it might constitute a connecting bond with some other group. This placement was followed by Blackwelder (1944, p. 220). Van Dyke (1928) described two new species (*robusta* and *confusa*) and related the genus to *Pleocoma* which would place it in the subfamily Pleocominae. This relationship had been previously indicated by Leng (1920). Although the correct phylogenetic placement of the genus would be desirable, it is beyond the scope of this paper and must await further information and study. Certain structural and biological characteristics seem to strengthen the relationship with *Pleocoma*, and it is therefore considered as belonging to the Pleocominae. Brown (1929) described *arizonica* and Saylor (1948) described *cazieri*, *dilemma*, *sexfoliata*, and *rossi*, bringing the total number of species previously known to eight. The five new species herein described raise this total to 12.

As is often the case when a genus is based on a single species the discovery of additional species often changes the generic diagnosis. This is true in this genus and more especially in connection with the antennae and pilosity which are specifically diagnostic. The antennae appear to be the most plastic and definitive of all the characters and as a result have a wide range of variability

¹ Chairman and Curator, Department of Insects and Spiders, the American Museum of Natural History, New York.

generically. The type species has only three lamellae in the antennal club, whereas we now know the following club formulas:

NUMBER OF LAMELLAE IN CLUB	SPECIES
3	<i>confusa</i>
3	<i>minuta</i>
3	<i>arizonica</i>
3	<i>glabrata</i>
3	<i>nigrita</i>
3	<i>brunnea</i>
$3\frac{1}{2}$	<i>dilemma</i>
4	<i>stathami</i>
4	<i>cazieri</i>
$4\frac{3}{4}$	<i>robusta</i>
$4\frac{3}{4}$	<i>rossi</i>
5	<i>leechi</i>
7	<i>sexfoliata</i>

Although the density and length of the pile on the elytral disc vary to a considerable extent within each species, the presence or absence of elytral pile constitutes a group character. The elytral disc is glabrous in *cazieri*, *stathami*, *glabrata*, and *nigrita* and is pilose in the remainder of the species.

Thus far no females are known for any species in the genus, and as proposed by Van Dyke (1928) they are probably wingless as is the case in *Pleocoma*. So far as known all specimens have been collected around lights, and we therefore know nothing about the biology or host plants.

The writer wishes to express his appreciation to Mr. Hugh B. Leech of the California Academy of Sciences without whose co-operation this project would have been impossible. Thanks are also extended to Miss Marjorie Statham who made the distributional map.

KEY TO THE SPECIES BELONGING TO THE GENUS *Acoma*

1. Elytral disc glabrous..... 2
Elytral disc pilose..... 5
2. Antennal club in male consisting of four lamellae of equal length, fifth segment sometimes slightly elongate but not forming a lamella..... 3
Antennal club in male consisting of three lamellae of equal length, seventh segment sometimes slightly elongate but not forming a lamella..... 4
3. Lateral elytral margins spinose; elytra transparent; color pale testaceous..... *stathami*
Lateral elytral margins pilose; elytra not transparent; color piceocastaneous..... *cazieri*

4. Color black; elytral striae deeply impressed..... *nigrita*
Color pale reddish brown; elytral striae shallowly impressed..... *glabrata*
5. Antennal club in male with fewer than seven lamellae..... 6
Antennal club in male with seven lamellae, equal in length..... *sexfoliata*
6. Antennal club in male with fewer than five lamellae..... 9
Antennal club in male with five lamellae, inner lamella sometimes shorter than outer four..... 7
7. Lamellae of antennal club equal in length and width; form elongate, narrow..... *leechi*
Inner lamella of antennal club shorter than outer four; form robust..... 8
8. Clypeal suture tumid medially; anterior pronotal angles not or feebly produced; size small, 5.5-6.5 mm..... *rossi*
Clypeal suture flat medially; anterior pronotal angles usually strongly produced anteriorly; size large, 6.5-11 mm..... *robusta*
9. Antennal club in male with three lamellae..... 10
Antennal club in male with four lamellae, inner lamella narrower and only half as long as outer three..... *dilemma*
10. Anterior pronotal angles acute, strongly produced anteriorly over eyes.....
..... *confusa*
Anterior pronotal angles obtuse, not or but feebly produced anteriorly over eyes..... 11
11. Elytral pile short and inconspicuous; color light brown..... *arizonica*
Elytral pile long and conspicuous; color dark reddish brown or piceous..... 12
12. Lateral margins of pronotal disc with one or more long erect hairs, sometimes with irregular depressions in same area; size small..... *minuta*
Lateral margins of pronotal disc without pile or depressions; size larger.....
..... *brunnea*

***Acoma stathami*, new species**

Large, robust, color pale testaceous throughout, elytral disc glabrous, transparent, antennal club with four lamellae of equal length.

MALE: Head with front between eyes deeply, densely rugosely punctate, clypeal suture not evident; clypeus with few scattered shallow punctures, lateral margins strongly reflexed, anterior margin more strongly reflexed and with lateral angles slightly elevated; maxillary palpi with terminal segment elongate, strongly grooved dorsally; antennae nine-segmented, scape strongly clavate, densely pilose, second, third, and fourth segments round and subequal, fifth elongate, twice as long as fourth, segments 6 to 9 inclusive forming the club, club longer than all other segments combined. Pronotum glabrous except for long, lateral ciliate hairs, surface sparsely, shallowly, irregularly punctate, punctures separated by about two to three times their own widths, median line impunctate, lateral margins evenly rounded, more constricted

anteriorly, anterior angles slightly produced, anterior margin shallowly bisinuate, basal margin slightly produced medially. Scutellum subtriangular, apex broadly rounded. Elytra glabrous except for lateral margins which have a row of short, strong setae, disc with shallow, obscure striae, sparsely irregularly punctate, lateral margins subparallel, strongly, evenly rounded at apex. Under surface densely clothed with long testaceous pile, anterior tibiae strongly tridentate, median and posterior tibiae with strong median or postmedian setigerous carinae, pygidium densely punctate and pilose. Length 8 mm., width 4.5 mm.

FEMALE: Unknown.

Holotype male and 18 male paratotypes collected at San Felipe, Baja California, June 15, 1952, by W. J. Gertsch, R. Schrammel, and M. Cazier. Holotype and paratypes in the collection of the American Museum of Natural History; paratypes deposited in the collection of the California Academy of Sciences. This species is named in honor of Miss Marjorie Statham, our departmental artist, who has greatly enhanced the value of many publications through her artistic efforts.

The series was collected at night around Coleman lanterns in the coastal area just north of San Felipe. They are very uniform in color, but the length varies from 5.5 to 8.0 mm. and the width from 2.8 to 4.5 mm. There is considerable variability in the size and shape of the funicular segments of the antennae and more especially in the fifth segment which in five specimens is expanded and almost forms a very small lamella. The pale color and transparency of the elytra make the species the most distinctive in the genus. It occurs sympatrically with *A. glabrata* Cazier and *A. nigrita* Cazier from which it can be readily separated by the above characters.

Acoma cazieri Saylor

Acoma cazieri Saylor, 1948, Proc. California Acad. Sci., vol. 24, no. 10, p. 341.

This is one of the larger and darker species in the genus and resembles *A. robusta* Van Dyke superficially. It can be separated from that species by the fact that the elytral disc is glabrous and the antennal club has four, rather than five, segments. It occurs sympatrically with *A. dilemma* Saylor at 15 miles north of El Refugio, Baja California, but can be separated from that species by its larger size, glabrous elytral disc, and the fact that the four

lamellae of the antennal club are of equal length. In *dilemma* the inner lamella is greatly reduced and the elytra are pilose.

TYPE LOCALITY: Baja California: Fifteen miles north of El Refugio.

GENERAL DISTRIBUTION: Baja California: San Domingo, July 19, 1938.

***Acoma glabrata*, new species**

Medium-sized, elongate, color light reddish brown, elytra slightly lighter than pronotum, elytral disc glabrous, not or but slightly transparent, antennal club with three lamellae of equal length.

MALE: Head with front between eyes deeply, densely, rugosely punctate, vertex depressed, surface impunctate, clypeal suture not evident; clypeus deeply, irregularly punctate, lateral margins strongly reflexed, anterior margin more strongly reflexed, feebly emarginate medially; maxillary palpi with terminal segment elongate, strongly grooved dorsally; antennae 10-segmented, scape strongly clavate, moderately pilose, second segment round, larger than third, third to seventh segments small, irregular in shape, seventh slightly produced anteriorly into a short, lamella-like process, segments 8 to 10 equal, elongate, and forming the club which is longer than scape and funicular segments combined. Pronotum widest at middle, lateral margins obliquely angulate anteriorly and posteriorly, anterior margin deeply bisinuate, posterior margin slightly produced medially, surface glabrous dorsally, lateral margins with row of ciliate hair, median longitudinal area on disc impunctate, sparsely, irregularly punctate laterally, punctures separated by from two to four times their own widths. Scutellum subtriangular, narrowly rounded apically, glabrous. Elytra glabrous except for marginal row of hair and fine setae, discal surface irregularly striate and punctate, striae shallowly impressed, area along suture rugose, lateral margins subparallel, strongly rounded apically. Under surface sparsely pilose, anterior tibiae strongly tridentate, middle and hind tibiae with median or postmedian, transverse, spinose carinae, pygidium sparsely punctate and pilose. Length 7.5 mm., width 4.0 mm.

FEMALE: Unknown.

Holotype male and 123 male paratotypes collected at San Felipe, Baja California, June 15, 1952, by W. J. Gertsch, R. Schrammel, and M. Cazier. Holotype and paratypes in the collec-

tion of the American Museum of Natural History, paratypes deposited in the collection of the California Academy of Sciences. Three specimens from 1 mile east of Wellton, Yuma County, Arizona, May (J. R. Slevin), and one specimen from Dome, Yuma County, Arizona, July 21, 1924 (E. P. Van Duzee), from the California Academy of Sciences belong to this species but have not been included in the paratype series.

The type series was collected at night around Coleman lanterns in the coastal area just north of San Felipe. The series is fairly uniform in color except that a few specimens have the elytra the same reddish brown as the pronotum. They vary in length from 5.0 to 8.5 mm., and in width from 2.3 to 4.1 mm. There is considerable variability in the size and shape of the funicular segments and in some specimens segments 6 and 7 appear as one elongate segment. The seventh funicular segment may or may not be produced anteriorly, and the length of the projection varies but is always short. In some specimens the clypeal margins are worn and in others the anterior margin is moderately, deeply, emarginate medially and the lateral angles are therefore prominent. It occurs sympatrically with *stathami* and *nigrita* but can be distinguished from both by its light reddish brown color. It resembles *brunnea* and *arizonica* but can be separated from both by the glabrous elytral disc and larger average size.

Acoma nigrita, new species

Medium-sized, elongate, color black, pile piceous, elytral disc glabrous, antennal club with three lamellae of equal length.

MALE: Similar in every respect to *glabrata* except for its black color, piceous pile, and the evident, deeply impressed elytral striae. Length 7.5 mm., width 3.5 mm.

FEMALE: Unknown.

Holotype male collected at San Felipe, Baja California, June 15, 1952, by W. J. Gertsch, R. Schrammel, and M. Cazier, in the collection of the American Museum of Natural History.

Although this species is represented by only one specimen and its status as a population is therefore in question, it was considered desirable to make it known because the characters given above are of equal or greater magnitude than those separating other distinct populations.

Acoma sexfoliata Saylor

Acoma sexfoliata Saylor, 1948, Proc. California Acad. Sci., vol. 24, no. 10, p. 342.

The name of this species is an unfortunate descriptive mistake, since the holotype and all four paratypes have seven rather than six lamellae of equal length in the antennal club. This represents the maximum number of segments known in the genus to date, and the species is quite distinct from any others. So far as known it is allopatric.

TYPE LOCALITY: Baja California: Seven miles south of El Marmol.

GENERAL DISTRIBUTION: Baja California: El Marmol, August 24, 1941.

Acoma rossi Saylor

Acoma rossi Saylor, 1948, Proc. California Acad. Sci., vol. 24, no. 10, p. 342.

An examination of the type and type series of 17 specimens of this species has shown that two distinct species are represented. Only one of the two paratotypes designated by Saylor is actually like the type of *rossi*. One paratotype and the 15 paratypes are quite distinct and are herein described as *A. leechi* Cazier. In *rossi* the inner lamella of the antennal club is shorter and narrower than the outer four, the shape is more robust and the color darker. In *leechi* all five lamellae are of equal length and breadth, the shape is narrower and more elongate, and the color is light brown. They occur sympatrically 15 miles north of Punta Prieta, Baja California.

TYPE LOCALITY: Baja California: Fifteen miles north of Punta Prieta.

Acoma leechi, new species

Small, narrow, elongate, color pale reddish brown, elytra sparsely pilose, antennae nine-segmented, club with five lamellae equal in length.

MALE: Head with front densely punctate, punctures large, irregular in shape, and occasionally coalescent, vertex impunctate, clypeal suture indicated by an elevated transverse line, more prominent medially; clypeus smooth, sparsely, irregularly, shallowly punctate, lateral margins strongly reflexed, anterior margin deeply emarginate medially, lateral angles strongly elevated; maxillary

palpi with terminal segment elongate, deeply grooved above; antennae nine-segmented, scape strongly clavate, sparsely pilose, second segment round, thicker than third, third narrow, slightly longer than second, fourth narrow, elongate, as long as second and third combined, segments 4 to 9 inclusive forming the club which is longer than all other segments combined, lamellae equal in length. Pronotum widest at middle, lateral margins extending obliquely forward and posteriorly, anterior angles obtuse, not produced, anterior margin feebly bisinuate, posterior margin nearly straight, not produced medially, surface sparsely, irregularly punctate and pilose, punctures separated by from two to three times their own diameters, narrow median longitudinal impunctate area, lateral and anterior margins with a row of long ciliate hairs. Scutellum subtriangular, apex evenly rounded. Elytra sparsely clothed with long, erect hairs, pile along lateral margins longer and more dense, surface sparsely irregularly punctate, striae scarcely impressed, irregular, side margins evenly rounded to apex. Under surface sparsely pilose, pygidium sparsely punctate and pilose. Length 4.8 mm., width 2.5 mm.

FEMALE: Unknown.

Holotype male and 14 paratotypes collected 10 miles south of Punta Prieta, Baja California, June 21, 1938, by Michelbacher and Ross, deposited in the collection of the California Academy of Sciences. Paratypes deposited in the collection of the American Museum of Natural History. One male paratype from 15 miles north of Punta Prieta, Baja California, July 29, 1938 (Michelbacher and Ross) in the collection of the California Academy of Sciences. (See Addendum, p. 12.)

This species is described from a series of 16 specimens bearing the paratype labels of *A. rossi* Saylor. The reasons for this separation of the type series and the comparative description are given in the discussion of *rossi*. It is with pleasure that the species is named in honor of Hugh B. Leech, Department of Entomology, California Academy of Sciences, whose cooperation made the present study possible.

***Acoma robusta* Van Dyke**

Acoma robusta VAN DYKE, 1928, Pan-Pacific Ent., vol. 4, no. 4, p. 159.

This is one of the largest species in the genus and appears to be most closely related to *A. rossi* Saylor, as the latter species is

herein redefined. It can be separated from *rossi* by its usually larger size and darker color and the fact that the inner lamella of the antennal club is only about three-fourths as long as the outer lamellae and much narrower. In *rossi* the inner lamella is only slightly shorter and narrower than the outer lamellae. In Baja California *robusta* occurs sympatrically with *A. confusa* Van Dyke at 15 miles west of La Paz and at Santiago. These two species resemble each other but can be easily separated by the differences as given in the key.

TYPE LOCALITY: Baja California: Triunfo, July 8, 1919.

GENERAL DISTRIBUTION: Baja California: La Paz, June 28, 1919; 15 miles west of La Paz, July 5, 1938; Santiago, July 8, 1938.

***Acoma dilemma* Saylor**

Acoma dilemma Saylor, 1948, Proc. California Acad. Sci., vol. 24, no. 10, p. 342.

This small species is known only from the type locality, and in general appearance resembles some specimens of *A. confusa* Van Dyke. It can, however, be distinguished from that species by its three and one-half (3 1/2) rather than three-segmented antennal club.

TYPE LOCALITY: Baja California: Fifteen miles north of El Rufugio.

***Acoma confusa* Van Dyke**

Acoma confusa VAN DYKE, 1928, Pan-Pacific Ent., vol. 4, no. 4, p. 160.

Although this species resembles *dilemma*, *robusta*, and *rossi*, the three-segmented antennal club and dark color make it difficult to separate from *brunnea*. However, there is a difference in the shape of the pronotum, and the elytral pile appears to be longer than in *brunnea*. It is one of the more common and variable of the Baja California species and occurs sympatrically with *robusta* at Santiago and 15 miles west of La Paz.

TYPE LOCALITY: Baja California: Coronodos Island, Gulf of California.

GENERAL DISTRIBUTION: Baja California: Mesquital, July 28, 1938; Venancio, July 17, 1938; 5 and 15 miles north of San Ignacio, June 24, 1938; 15 miles west of La Paz, July 5, 1938; Loreto, May 20, 1921; Santiago, July 8, 1938; 25 miles south of Santa Rosalia, July 25, 1938.

Acoma arizonica Brown

Acoma arizonica BROWN, 1929, Canadian Ent., vol. 61, p. 212.

This appears to be the most abundant of the three species known from the United States and is the most widely distributed. In the 35 specimens available for study there is considerable variability in the length of the elytral pile, but most of them have it short and inconspicuous. The anterior clypeal margin may be evenly rounded or strongly bidentate, and the pronotal punctuation is variable. When more specimens are available it may prove to be a composite species. It is closely related to *brunnea* as discussed under that species and occurs sympatrically with *A. glabratula* Cazier, 1 mile east of Wellton, Arizona.

TYPE LOCALITY: Arizona: Pima County, September 1, 1925.

GENERAL DISTRIBUTION: Texas: Palm Collection. Arizona: Walton, August 9, 1917; Temple, August 1, 1917; Tucson, July 25, 1925; San Xavier near Tucson, July 24, 1916; Agua Fria, August 6, 1927; Yuma County, August 9, 1934; 10 miles north of Gila Bend, July 22, 1924, August 20, 1924; Avondale Ranch, Agua Fria, August 7, 1917; Cibola, August, 1911; Florence, July 29, 1917; Wellton, June 28, 1950; 1 mile east of Wellton, May. California: Calexico, August 11, 1914.

Acoma minuta, new species

Small, narrow, color piceous, elytra slightly lighter than pronotum, elytral disc pilose, pile long and erect, antennal club with three lamellae of equal length.

MALE: Head with vertex smooth, front between eyes deeply rugosely punctate, almost reticulate, clypeal suture evident laterally, slightly tumid medially, clypeal surface sparsely punctate, punctures separated by about their own widths, margins strongly reflexed, anterior margin more strongly reflexed than lateral, anterior angles evenly rounded, anterior margin straight; palpi with terminal segment elongate, shallowly depressed dorsally; antennae nine-segmented, club three-segmented, longer than funicular segments and scape combined, lamellae of equal length. Pronotum widest at middle, side margins obtusely angulate medially, evenly rounded in front and behind, anterior margin bisinuate, produced medially, posterior margin feebly bisinuate and produced medially, all margins fimbriate, hairs very long; discal surface sparsely, minutely punctate, punctures separated

by from two to three times their own widths, median longitudinal line impunctate, lateral discal margins more densely punctate and with shallow irregular depressions in front of median transverse line on each side, each depression with three erect hairs. Scutellum impunctate except at extreme base, side margins subparallel, apex broadly rounded. Elytra with side margins subparallel, broadly rounded at apex, surface sparsely clothed with long erect pile, striae punctures bare, costal punctures pilose, lateral margins strongly fimbriate. Under surface sparsely punctate and clothed with long hair; anterior tibiae tridentate, basal tooth small and nearer base than apex, tarsi about two-thirds longer than tibiae; pygidium elliptical, elongate, longer than wide, surface sparsely punctate and pilose; color beneath rufous. Length 4.2 mm., width 2.0 mm.

FEMALE: Unknown.

Holotype male and 48 paratotypes collected at Ahumada (Villa Ahumada), Chihuahua, Mexico, July 22, 1952, at light by R. B. and J. M. Selander. Holotype and six paratypes deposited in the collection of the American Museum of Natural History, 42 paratypes in the collection of Mr. Henry Howden who very kindly made the material available to the writer.

This is the smallest species thus far known in the genus. In the series of 49 specimens, there is comparatively little variability. Most of the specimens have the pronotum a shade darker in color than the elytra, the lateral pronotal impressions vary in extent, and in a few specimens are absent. When lacking, the area is more densely punctate. In all specimens there is at least one hair on each side and usually two or three. In some specimens the anterior clypeal margin is slightly emarginate, but the anterior angles are not dentate as in *A. brunnea* Casey.

The species appears to be most closely related to *A. brunnea* Casey but can be separated from it by its smaller size, usual bicolored appearance, the presence of depressions or pile or both on the lateral discal margins of the pronotum, and by its less densely punctate clypeal surface. From the remainder of the species having three lamellae in the antennal club, it can be separated as shown in the key.

***Acoma brunnea* Casey**

Acoma brunnea CASEY, 1890, Ann. New York Acad. Sci., vol. 5, p. 167.

Although this species is closely related to *A. arizonica* Brown, it appears to be distinct, at least so far as the material on hand is concerned. Only three specimens that match Casey's type have been examined and, although somewhat variable, especially in the pilosity, they can be separated from *arizonica*. They are darker in color and the elytral pile is usually much longer. The distributions overlap to a considerable extent, but no sympatric samples have been seen.

TYPE LOCALITY: Texas: El Paso.

GENERAL DISTRIBUTION: Arizona: Gila River Valley, San Carlos, August (D. K. Duncan); base of Pinal Mountains, September (D. K. Duncan). New Mexico: Lordsburg.

ADDENDUM

Since the correcting of page proofs of this review, the following important distributional records for *A. leechi* Cazier have been discovered: one specimen each from the north end of Tiburon Island, Sonora, Mexico, July 9, 1952, and Desemboque, Sonora, Mexico, July 7, 1952 (C. and P. Vaurie). These Sonoran records add to the proof that species of insects are able to cross the Gulf of Baja California by island hopping in the vicinity of Tiburon Island.

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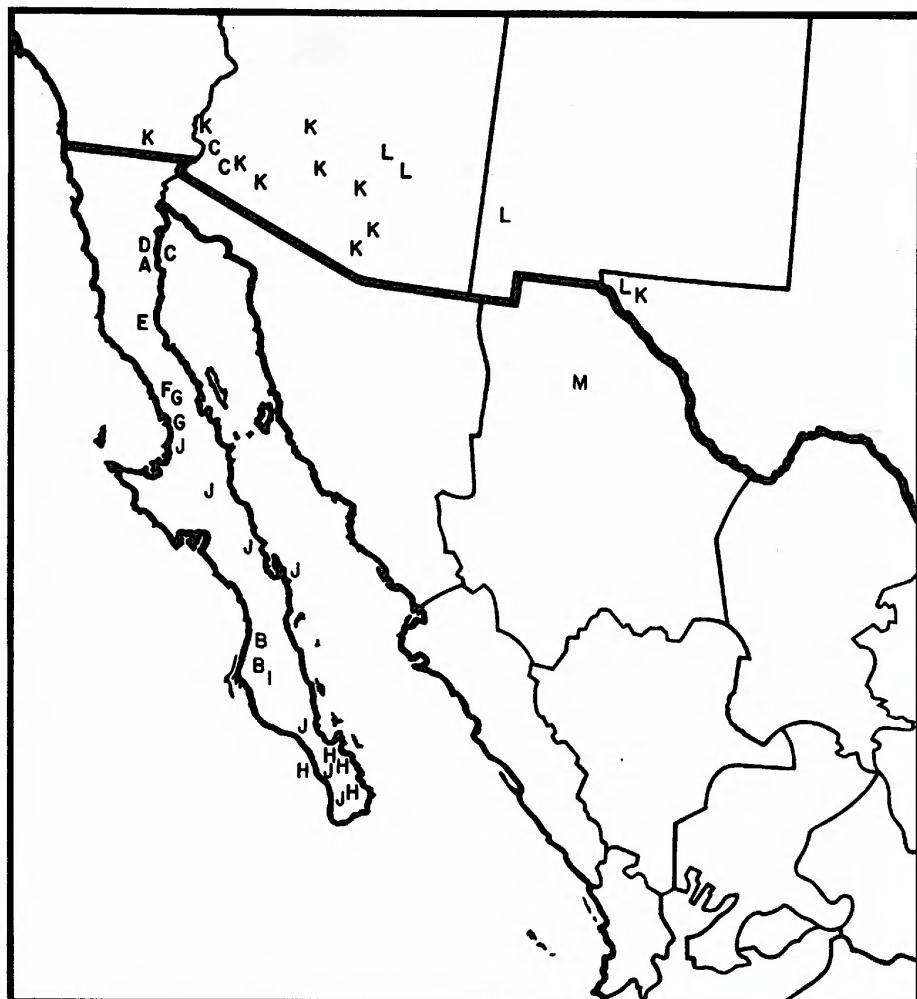


FIG. 1. Distribution of species. A. *Acoma stathami*. B. *A. cazieri*. C. *A. glabrata*. D. *A. nigrita*. E. *A. sexfoliata*. F. *A. rossi*. G. *A. leechi*. H. *A. robusta*. I. *A. dilemma*. J. *A. confusa*. K. *A. arizonica*. L. *A. brunnea*. M. *A. minuta*.

